

POSTSCRIPT.

Descriptions of some American Perlidæ, together with Notes on their Habits.

Read June 20th, 1848.

THE anatomical facts shown in the paper on *Pteronarcys* and its affinities, already communicated to this Society, prove that the insects of that genus differ greatly from those of *Perla*, and others of the same family; and that instead of being placed at the head of the tribe, according to the views of M. Pictet, they more naturally follow *Perla*, and precede *Capnia* and *Nemoura*, both which they resemble in the form of the alimentary canal. On the other hand, they seem to be connected with the former genus by means of *Perla infusata*, which has the eighth abdominal segment developed as in *Pteronarcys*. The true *Perlæ* approach the *Orthoptera*, through the *Blattidæ*, in the structure of the alimentary canal, in the form of the manducatory organs, in the membranous spots at the base of the antennæ, and in the habit of carrying their eggs attached in a mass to the under surface of the body,—the subgenus *Acroneuria* of Pictet, the *Perla abnormis* of Newman, being placed at the head.

The species *Perla arenosa* of M. Pictet most certainly is the *Perla abnormis* of Mr. Newman. The former gentleman states that he has examined three female specimens of his insect, one from Philadelphia, sent to him from the museum at Paris; a second from Pennsylvania belonging to the Berlin museum; and a third to the museum of Neufchatel, also obtained from the United States. The original specimen of *Perla abnormis*, which M. Pictet knows only from description, was obtained from North America; and Mr. Barnston took this species on the Albany River in Canada. Since the return of this gentleman to Canada I have received from him some specimens of a *Perla* in spirit for dissection, taken at Tadonsac, on the northern shore of the River St. Lawrence, which on comparison with the original specimen of *Perla abnormis* now in the British Museum, have proved to be that species; and on comparing the whole of these with M. Pictet's figure and description of *P. are-*

nosa, they agree with both in every particular, so that I have no doubt of their identity. The species appears to have a wide geographical range, from Philadelphia southward as far north as Canada; and probably is the common species of the North American continent. The larva and pupa of this species have also been taken by Mr. Barnston, and specimens of them, presented by that gentleman, are now in the cabinets of the British Museum. As they have not hitherto been described, I may state generally that in size, colour and markings the pupa closely resembles that of the European species, *Perla bipunctata*, Pictet*. The larva is smaller, and of the same colour as the pupa, but is less distinctly marked. It is yellow with black bands. Its head is flattened and subtriangular, with the eyes black, depressed, and placed on the upper lateral surface, and on the front there are three minute black points in the place of the future ocelli. The antennæ are setaceous, yellow, and have about ninety articulations. The labrum is short, wide, and of a brown colour, and the front has two transverse, wavy brown bands. The prothorax is suboval, flattened, with two indistinct black marks on the upper surface, encircled with a black band. The meso- and metathorax are transverse, subquadrate, with the posterior angles and margin dilated. Each segment has an indistinct subtriangular mark in the middle, encircled with a broad black band. The abdomen is yellow, with the posterior margin of each segment on the dorsal surface dark brown, or black. The caudal styles are tapering, yellow, and with about fifty articulations. The ventral surface of the body is entirely yellow, and there are small branchiæ on the first and second abdominal segments, but not on the ventral surface of the thoracic. The legs are compressed, with the thighs dilated and the tibiæ densely ciliated.

The pupa differs from the larva in its greater size, darker colour and markings, and in the elongation of the angles of the meso- and metathoracic segments into long triangular rudiments of wings, which, in addition to the black band at the base of each, have also another at their apex. The thighs are dilated as in the larva, and have two brown bands, and the tibiæ are also ciliated for swimming. It is entirely without external branchiæ.

The habits of this species have been carefully observed by Mr. Barnston.

* *Loc. cit.* pl. 11.

In some manuscript notes, which he has favoured me with, he has designated the perfect insect the *Drummer* (*Perla sonans*, Barnston's MSS.). He says that, "when confined upon a table it sometimes makes a drumming noise, by beating on the wood with the end of its abdomen, whence I have given it its specific name, as I have not observed this done by any other species. It appears after the *Pteronarcys regalis*, and is more numerous. The perfect insect prefers the shade in the heat of the day. The sexes pair like the Grasshopper, and their union lasts for some time. Its habits separate it much from *Pteronarcys* and *Phryganea*. The larva and nymph are aquatic and carnivorous. The cast-off spoil of the nymph is generally found under stones on the banks of rivers. The larva is very active in the water, and frequents the clefts and cracks in decayed stumps of trees, into which its flattened shape permits it to enter with facility. It is a favourite food of the trout."

The *Pteronarcys*, according to Mr. Barnston's observations, is as inferior to this *Perla* in its habits of life, as I have shown it to be in its organization. In its pupa state it resides constantly at the bottoms of streams, and the perfect insect comes forth at an earlier period, and at a lower temperature of the season than *Perla*. Some other Canadian *Perlidae*, which are more nearly allied to it in structure than *Perla abnormis*, come forth at about the same time, and as it is doubtful whether these species have yet been described, I shall characterize them from specimens given by Mr. Barnston to the British Museum, and add some observations on the habits of each from notes made by that gentleman.

The generic characters of *Pteronarcys* I propose to correct as follows, in accordance with its structure.

GENUS PTERONARCYS, *Newm.*

CHAR. GEN. *Segmenta thoracica* etiam in Imagine branchiis externis prædita. *Alæ* magnæ, reticulatæ. *Palpi maxillares* labialibus multò longiores, 5-articulati; articulis 2 basalibus brevibus, reliquis elongatis, externè dilatatis. *Mandibulæ* parvæ, obtusæ. *Segmentum abdominale* octavum in mari processu longo ventrali munitum, in fœminâ paulò evolutum vel bifidum.

The following new species has recently been brought by Mr. Hartweg from California.

PTERONARCYS CALIFORNICUS ♂, capite thoraceque saturatè brunneis, fronte clypeo labroque rufis, oculis ocellisque nigris, segmentis thoracicis lineâ longitudinali interruptâ flavâ, abdomine aurantiaco lateribus brunneis, stylis caudalibus basi flavis, antennis pedibusque totis atris, alis obscuris nigro-nervosis sed absque maculâ stigmali.

Hab. in Californiâ, *D. Hartweg.*

This species, like others of the genus, possesses the thoracic and abdominal branchiæ. It is very closely allied to *P. Proteus*, and is of the same size; but it differs from that species in having the antennæ, eyes and legs entirely black, the labrum and front of the head red, the wings of a darker colour, more strongly veined, and without the stigmal patch. The process from the eighth segment in the male also, although of the same form as in *P. Proteus*, readily distinguishes the two species of this sex. It is broad, pilose, and deeply scarred in *P. Californicus*, but is much narrower, and is sparingly punctured in *P. Proteus*.

I shall now proceed to characterize the new species of *Perla*, together with a species of *Nemoura*, collected by Mr. Barnston in Canada.

1. *PERLA CITRONELLA* (*Barnston MSS.*), saturatè flava, antennarum articulis 33-35, oculis ocellisque brunneis, alis hyalinis pallidè luteis margine costali flavis, abdominis dorso brunneo.—Long. lin. 3-3½.

Hab. in Canadâ, ad Albany River, latit. 54°.

This species resembles the *Perla flava*, Pictet, which occurs in Europe as far northward as Lapland, but seems to differ from it in the antennæ being entirely black, the thorax yellow, without a black lateral margin, and in the wings being yellow, without green nervures. It is however about the size of *Perla flava*, and may be only a variety. "It usually remains on the branches or leaves of trees during the day."

2. *PERLA MINIMA* (*Barnston MSS.*), nigra nitida, antennarum articulis circa 26 submoniliformibus pilosis, fronte paululùm excavato, palpis subclavatis, thorace angusto subquadrato, stylis caudalibus 13-articulatis, alis obscuris nigro-nervosis in mari brevibus obtusis abdomen semicooperientibus in fœminâ amplis corpore longioribus.—Long. lin. 1¾-2.

Hab. in Canadâ, ad Albany River.

This species somewhat resembles the *Nemoura nigra*, which is from Pennsylvania.

The pupa is of a light brown colour. "The perfect insect retreats when out of the water to the cracked fissures of decayed trees. This is the habit of most of the species. They shun the light. This insect appears early in April. The wings of the male are twisted, and cover only half of the abdomen."

3. *CAPNIA VERNALIS*, nigra nitida pilosa, thorace posticè rotundato, antennarum articulis 30-33 pubescentibus, alis obscuris pilosiusculis nervis magnis nigris, stylis caudalibus subulatis 21-23-articulatis.—Long. lin. $2\frac{1}{2}$.

Perla vernalis, *Barnston MSS.*

Hab. in Canadâ, ad Albany River.

Male smaller and more intensely black than the female. This is a minute species, with the general aspect of *Sialis*. It resembles *Capnia Pygmæ*, Pictet, which inhabits Pennsylvania and Newfoundland, and perhaps is that species. Mr. Barnston says, "The nymph comes up frequently in the cracks of the ice, and casts its spoil there. It comes up *when the thermometer stands at freezing.*"

The next is an entirely new species, and together with an European one, *Nemoura trifasciata*, Pictet, may form a subgenus, which I propose to designate *Brachyptera*, from the short anterior wings of the males.

NEMOURA (BRACHYPTERA) GLACIALIS (*Barnston MSS.*).

Mas saturatè brunneus ferè niger, thoracis margine anteriore recto, alis anterioribus triangularibus rudimentalibus segmentum abdominale primum tantùm attingentibus; posterioribus albidis longissimis acutis emarcidis decussatis, antennis elongatis pubescentibus 53-56-articulatis, pedibus longis compressis cursoriis; paris postremi longissimis, abdominis segmento terminali lato plano pubescente.

Fœmina multò major, in reliquis tamen similis, capite paululùm excavato, alis amplis obscure brunneis nigro-nervosis.—Long. unc. $\frac{1}{2}$.

Hab. in Canadâ, ad Albany River.

This insect differs from the European species, *Nemoura trifasciata*, Pictet, in the wings of the females being entirely brown, and also the legs; and in the straight margin to the prothorax. Like that species, "It appears in the spring (end of March or beginning of April), when the ice becomes honey-combed, and even before then, at the same time as the preceding species

(*Capnia vernalis*), but it is not so numerous. It pairs in the crevices of decaying ice. The male has long antennæ, and his wings are generally rumpled, as if glued together. I believe he seldom takes wing." Mr. Barnston tells me that he has seen this insect coming up between the crevices of the ice.

DESCRIPTION OF PLATE XXI.

- Fig. 1. Imago of *Pteronarcys*, male:—of the natural size.
Fig. 2. Pupa of *Pteronarcys*, male:—of the natural size.
Fig. 3. Branchial tuft, showing the trachea within it (*a*) and its mode of distribution (*b*).
Fig. 4. Branchial filament (*c, d, e*), showing the direction of the current of blood.
Fig. 5. Inferior surface of *Pteronarcys*, showing the situation of the branchiæ (*b, b, b*), and the sternal orifices (*f, g, h*).
Figs. 6, 7, 8. Left prothoracic spiracle: (6) closed, (7) partly open, (8) fully open.
Fig. 9. One of the abdominal false spiracles with trachea.
Fig. 10. Diagram of the body, with the internal respiratory organs and alimentary canal: (*i*) bundle of tracheæ from the second spiracle giving off branches to the wings, and others across the body, (*k*) a branch from the second, and (*l*) one from the third spiracle, (*m*) œsophagus, (*n*) the crop, (*o*) gastric cæca, (*p*) stomach, (*q*) ilium, (*r*) the Malpighian vessels, (*s*) colon, (*t*) rectum.
Fig. 11. Termination of one of the lateral tracheæ.
Fig. 12. Alimentary canal in *Perla*.
Fig. 13. Alimentary canal in *Sialis*.
Fig. 14. Nervous system: (*u, v, w*) entofurca, (*x*) testis and duct, (*y*) vesiculæ seminales, (*z*) ductus ejaculatorius and penis.
Fig. 15. Testicular follicles.
Fig. 16. Inferior surface of the abdominal segments in the male.
Fig. 17. Inferior surface of the abdominal segments in the female.